

## GUIDE

^ The United States Department of Agriculture, Agricultural ^  
^ Research Service (USDA-ARS) is now distributing software ^  
^ for UNIX workstations including source code, to generate ^  
^ daily weather (maximum and minimum temperature, precipitation ^  
^ and solar radiation). This UNIX version is written in FORTRAN 77 ^  
^ and is based on the USCLIMATE model written in QBASIC. ^  
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## Loading and using a FORTRAN version of GEM for UNIX workstations

## 1. Getting started

This FORTRAN version of the GEM simulation model is provided so that the model can be run on UNIX workstations.

This file provides you with the information necessary to access, compile, run and examine output data from the GEM model, including an example run that is provided with the code. Details regarding the model's theoretical and numerical frameworks, definition of model parameters, etc. may be found in "Microcomputer Program for Daily Weather Simulation in the Contiguous United States", which details the USCLIMATE version of the model. It is recommended that you read this booklet before proceeding with loading and running the GEM model. In what follows, commands to be entered by you on a UNIX-based computer are italicized, and descriptive information is contained in [square brackets].

The differences between this UNIX, text-based version of the GEM model and the PC version of the USCLIMATE model are:

- \* You can explicitly specify just one station for computation of baseline climate statistics by giving the station name, or you can specify a latitude and longitude.
- \* If you select a target latitude and longitude, you may select

from a list of all stations within a radius of 100 miles. You can then choose which stations will be used to compute inverse-distance-weighting parameter values for the site you have chosen.

- \* You can run this in a batch mode, or interactively (as the PC version does).
- \* This UNIX version has no graphics.
- \* This UNIX version runs much faster.

## 2. Assumptions

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- \* Working knowledge of the UNIX operating system.
- \* Some knowledge of FORTRAN-77.

## 3. Examining the ftp site content

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Note the following files are under anonymous ftp site:

README	-- A file that describes the model (SUGGESTED YOU READ IT FIRST.).
gem.f	-- FORTRAN 77 source file containing the model code.
gem	-- The executable file.
gem.input	-- A file containing runtime parameters and inputs for the model (see below).
gem.site	-- A file that contains the Fourier coefficients of precipitation for each station (see below).
gem.temp	-- A file that contains the 13 parameters, which are required to describe mean and coefficient of variation values of Tmax, Tmin and radiation, for each station (see below).
gem.example	-- A file containing an example of running the model (see below).

## 4. Loading from our anonymous site

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- \* Make a directory for the software and change to that directory.
- \* Type "ftp 140.218.193.135" (ars-boi.ars.pn.usbr.gov)
- \* Login as "anonymous"
- \* Give your E-mail address as password
- \* Type " cd /pub/gem/"
- \* Get all the files listed in section 3 (mget UNIX command)

If you encounter problems with the above procedure, send e-mail to Dr. Greg Johnson: gjohnson@nwrc.ars.pn.usbr.gov, or call him at the USDA-ARS, Northwest Watershed research Center at 208-422-0700.

Notes: A complete GEM portotype is now being produced for view and accessing on the World Wide Web and is available through the NWRC home page at <http://ars-boi.ars.pn.usbr.gov/nwrc/gjohnson/gem.html>

## 5. Running the model

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The model requires two or three input files:

An ASCII file containing the Fourier parameters for p00, p01, beta and mu. This file provided is for 360 U.S. observation stations, and is found in the file "gem.site".

An ASCII file containing the parameters to describe the mean and coefficient of variation values of Tmax, Tmin, and radiation. It can be found in the file called "gem.temp".

An ASCII input file, called "gem.input", which defines runtime parameters. This file represents answers to questions asked of the user when the code is run interactively.

To compile the model if you have modified the gem.f code type:

```
f77 gem.f -o gem
```

If you wish to run the model interactively, type

```
gem
```

and answer the questions as they are asked. We suggest that you use the "gem.input" file for your first test run, in which case you enter

```
gem < gem.input
```

In this case, the output will come directly to your screen. If you wish to redirect the output to a file called "gem.output" type

```
gem < gem.input > !gem.output
```

Here, "gem.output" contains a variety of information as specified by the user in the file gem.input. If you wish to run the model in background mode on your UNIX machine, type

```
gem < gem.input > !gem.output &
```

To use the Network Queuing System (NQS), (i.e., to run the model in batch mode), contact your system administrator or type man -k nqs (if available on your system).

In the example file gem.input an example of a model run for Boise, ID, including expected annual precipitation, total precipitation in m days and n years of simulation of precipitation, Tmax, Tmin and radiation are provided.

In order to verify that your machine is producing the correct answers for the model configuration provided, an example file is provided, called "gem.example". You can type

```
diff gem.example gem.output >difile  
more difile
```

to look at the difference between your machine's output and the expected

output of GEM from this simulation.

## 6. Where to Get Help

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For help with GEM model execution and structure direct questions and comments to:

Dr. Greg Johnson  
USDA, NRCS  
National Water and Climate Center  
101 SW Main St., Suite 1600  
Portland OR 97204-3224 USA  
Phone: (503) 414-3017  
Fax: (503) 414-3101  
E-mail: gjohnson@nwrc.ars.pn.usbr.gov  
or: gjohnson@storm.wcc.nrcs.usda.gov

## 7. Useful additional files and source codes

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The file gemintro in the /pub/gem directory of the anonymous ftp server site gives information about the latest work on the GEM model.

The program, "genpar.f" generates parameter file "gem.temp" for temperatures, solar radiation, etc. It analysis n years daily data and uses FFT to calculate annual mean and amplitude of each meteorological element (i.e. daily maximum temperature, etc.) and its coefficient of variation.

The program, "agua.f" calculates the parameter matrix  $Z(I,K)$  for each station in "gem.site" file. J from 1 to 4 are P00, P10, beta and mu, K from 1 to 13 are the annual mean, first 6 harmonic's amplitude and phase angle of these 4 parameters.